Nanoscale Bioconjugates as Passive and Active Detection, Diagnosis and Treatment Systems

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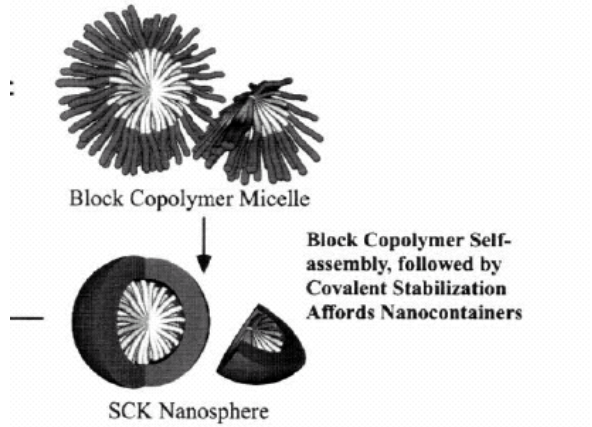

Self-assembled hollow nanocages that can contain diagnostic and therapeutic agents.

Description

- Self assembled nano-cages
- External coating of biomolecules for cell recognition and cell entry
- Hollow core contains radionuclide or other therapeutic agent

Innovative Claims/NASA Significance

We propose the development of multi-component recognition units that will harness the information generated from the human genome project to prepare devices that can be produced with a few building blocks by an automated process for cancer-specific mRNA targeting and imaging, and thus, early detection and diagnosis. Furthermore, the fact that these agents can be individualized and made patient specific, will allow diagnosis and treatment of primary and metastatic tumors with the same agent utilizing different types of radioactivity. These multi-functional nanostructures will facilitate dynamic monitoring with high sensitivity toward the direct detection and diagnosis of cancerous tissue at the earliest stage. Innovative advances will be realized also in the fundamental aspects of oligonucleotide chemistry, nanostructured materials design, imaging technologies, and integration of each of these disciplines to impact the modem field of medicine.

Plans

Year 1.

Construct m RNA detection conjugates with imaging and TAT agents.

Construct nano-cages with fluorescent probes (imaging and pH tracking) and radionuclide.

Year 2.

Detect and assay cell entry and surface interactions.

Year 3.

Perform diagnosis of cancer cells *in-vitro* and *in-vivo.*